

WHAT IS CLAIMED IS:

1. A hinge apparatus for connecting a fold and a main body of a mobile phone to each other, comprising:

5       a fixed hinge part provided at said main body; and  
      a rotary hinge part provided at said fold and hinged to said fixed hinge part so to be rotated relative to the fixed hinge part, said rotary hinge part comprising:

10       a power generating unit generating a rotating drive force;

      a rotary cam and a fixed cam selectively performing power transmission of the rotating drive force of the power generating unit;

15       a camshaft assembled with the fixed cam such that the camshaft and the fixed cam are axially movable relative to each other, said camshaft being connected at an end thereof to the fixed hinge part such that an idle rotation of the camshaft relative to the fixed hinge part is prevented; and

20       an elastic biasing member provided in said camshaft to elastically bias the fixed cam and the camshaft in opposite directions.

2. The hinge apparatus according to claim 1, wherein the  
25 camshaft comprises:

a boss assembled with the fixed cam such that the boss and the fixed cam are axially movable relative to each other; and

a boss shaft integrated with the boss into a single structure, said boss shaft being received in a boss shaft receiving slot of the fixed hinge part, so that an idle rotation of the boss shaft relative to the fixed hinge part is prevented.

3. The hinge apparatus according to claim 2, wherein a key guide groove is formed on an internal surface of the boss, and a key is formed on an external surface of the fixed cam, said key movably engaging with the key guide groove, so that the boss and the fixed cam are axially movable relative to each other.

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4. The hinge apparatus according to claim 3, wherein a pin slot is formed at the boss, and a pin having a width larger than a width of the pin slot is inserted into the pin slot, so that an axial movement of the fixed cam is limited.

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5. The hinge apparatus according to any one of claims 2 to 4, wherein a stopper is formed at the boss so as to prevent the elastic biasing member from being excessively compressed to a level exceeding a predetermined reference level at which the elastic biasing member is plastically deformed, during a

relative axial movement of the fixed cam and the camshaft.

6. The hinge apparatus according to any one of claims 1 to 4, wherein the rotary cam, the fixed cam and the camshaft  
5 are set in a casing to form a module.

7. The hinge apparatus according to claim 5, wherein the rotary cam, the fixed cam and the camshaft are set in a casing to form a module.

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8. The hinge apparatus according to claim 1, wherein the camshaft comprises:

a boss assembled with the fixed cam such that the boss and the fixed cam are axially movable relative to each other; and

15 a boss shaft separately produced from and assembled with the boss, said boss shaft being received in a boss shaft receiving slot of the fixed hinge part, so that an idle rotation of the boss shaft relative to the fixed hinge part is prevented.

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9. The hinge apparatus according to claim 8, wherein a key guide groove is formed on an internal surface of the boss, and a key is formed on an external surface of the fixed cam, said key movably engaging with the key guide groove, so that  
25 the boss and the fixed cam are axially movable relative to each

other.

10. The hinge apparatus according to claim 9, wherein a pin slot is formed at the boss, and a pin having a width larger than a width of the pin slot is inserted into the pin slot, so that an axial movement of the fixed cam is limited.

11. The hinge apparatus according to any one of claims 8 to 10, wherein a stopper is formed at the boss so as to prevent the elastic biasing member from being excessively compressed to a level exceeding a predetermined reference level at which the elastic biasing member is plastically deformed, during a relative axial movement of the fixed cam and the camshaft.

12. The hinge apparatus according to any one of claims 8 to 10, wherein the rotary cam, the fixed cam and the camshaft are set in a casing to form a module.

13. The hinge apparatus according to claim 11, wherein the rotary cam, the fixed cam and the camshaft are set in a casing to form a module.

14. A hinge apparatus for connecting a fold and a main body of a mobile phone to each other, comprising:  
a fixed hinge part provided at said main body; and

a rotary hinge part provided at said fold and hinged to said fixed hinge part so to be rotated relative to the fixed hinge part, said rotary hinge part comprising:

5 a power generating unit generating a rotating drive force;

a coupling unit receiving the rotating drive force of the power generating unit;

10 a rotary cam assembled with the coupling unit such that the rotary cam and the coupling unit are axially movable relative to each other, but are prevented from idly rotating relative to each other;

15 a fixed cam engaging with or disengaging from the rotary cam, and assembled at an end thereof with the fixed hinge part such that the fixed cam is prevented from idly rotating relative to the fixed hinge part; and

an elastic biasing member provided in said coupling unit to elastically bias the rotary cam and the coupling unit in opposite directions.

20 15. The hinge apparatus according to claim 14, wherein the coupling unit comprises:

a coupler receiving the rotating drive force of the power generating unit; and

25 a boss assembled with the rotary cam such that the rotary cam and the boss are axially movable relative to each other,

but are prevented from idly rotating relative to each other, so that the boss transmits the rotating drive force to the rotary cam.

5        16. The hinge apparatus according to claim 15, wherein a key is formed on an internal surface of the boss, and a key guide groove is formed on an external surface of the rotary cam, said key movably engaging with the key guide groove.

10       17. The hinge apparatus according to claim 15, wherein a key guide groove is formed on an internal surface of the boss, and a key is formed on an external surface of the rotary cam, said key movably engaging with the key guide groove.

15       18. The hinge apparatus according to any one of claims 14 to 17, wherein the rotary cam has a cavity along a central axis thereof, and the fixed cam has a shaft, said shaft of the fixed cam being inserted into the cavity of the rotary cam and acting as a rotating axis of the rotary cam.

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19. The hinge apparatus according to any one of claims 14 to 17, wherein the rotary cam and the fixed cam are changed in shapes thereof so as to correspond to each other.

25       20. The hinge apparatus according to claim 18, wherein

the rotary cam and the fixed cam are changed in shapes thereof so as to correspond to each other.